ZooKeys 9: 21-26 (2009)
doi: 10.3897/zookeys.9.184
www.pensoftonline.net/zookeys

RESEARCH ARTICLE

A peer-reviewed open-access journal
ZooKeys
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Lithophane leeae (Lepidoptera, Noctuidae, Xyleninae), a striking new species from southeastern Arizona

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Academic editor: *B. Christian Schmidt* | Received 5 April 2009 | Accepted 23 April 2009 | Published 12 May 2009

urn:lsid:zoobank.org:pub:501A13AC-AE9E-4C59-9D86-9E7B45CA15E7

Citation: Walsh B (2009) *Lithophane leeae* (Lepidoptera, Noctuidae, Xyleninae), a striking new species from southeastern Arizona. In: Schmidt BC, Lafontaine JD (Eds) Contributions to the Systematics of New World Macro-Moths. ZooKeys 9: 21-26. doi: 10.3897/zookeys.9.184

Abstract

A new species of noctuid moth in the genus *Lithophane* Hübner is described and illustrated. The largest member in the genus, *Lithophane leeae* Walsh, **sp. n.** is known from a single female from the Chiricahua Mountains in southeastern Arizona, and is strikingly different from other described species of *Lithophane*. Mitochondrial DNA data place *L. leeae* closest to (but quite divergent from) *Lithophane atara* (Smith) in the *Lithophane lepida* Grote species-group of pine-feeding *Lithophane* species.

Keywords

Lepidoptera, Noctuidae, *Lithophane*, taxonomy, Arizona, DNA barcode

Introduction

While the mountains of southeastern Arizona are classic moth collecting locations that have been heavily sampled over the past 60 years, they still continue to produce new species. The author has made a conscious effort over the past five years to collect at elevations above 2000 meters in May and June, before the summer monsoons that also lure most moth collectors to Arizona. In the early evening of June 14th, 2007 a large

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pink moth flew into a mercury-vapor collecting sheet in the Chiricahua Mountains in Cochise County. Its appearance in flight was very similar to females of *Coloradia doris* Barnes (Saturniidae), which were also flying in some numbers at the time, and so the moth was ignored for several minutes. Upon closer inspection, it turned out to be a very large species of *Lithophane* Hübner, quite distinct from any known species. Despite fairly extensive collecting at this (and nearby) locations from late May through mid-July over the past five years, no other individuals have been found. While there is a quite reasonable reluctance to describe a species from a single specimen, this individual is so distinct from any described *Lithophane* as to make it highly unlikely to be an aberration of a known species. DNA barcoding confirms that this is a distinct species within the *lepida* Grote species-group (as defined by Forbes 1954; also see Troubridge and Lafontaine 2003).

***Lithophane leeae* Walsh, sp. n.**
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Figs. 1, 2

Type material. Holotype female. (Fig.1): USA, Arizona, Cochise County, Chiricahua Mountains, Onion Saddle, 7700', 14 June 2007. B. Walsh leg. Presently in the private collection of Bruce Walsh, to be deposited in the McGuire Center for Lepidoptera and Biodiversity. DNA sequence in the BOLD Barcode of life data system (Ratnasingham and Hebert 2007).

Etymology. Known from a singularly unique female festooned in pink, this species is named after the author's wife, Lee Fulmer.

Diagnosis. While superficially similar to *L. atara* (Smith) (Fig. 3) in maculation**,** *Lithophane leeae* is the largest known species in the genus *Lithophane.* Although *Lithophane leeae* keys out to *L. atara* in the key of Troubridge and Lafontaine (2003), it clearly differs from *L. atara* in being a significantly larger species (forewing length 25 mm vs. 18-20 mm), with more extensive and brighter pink on the dorsal surface of the hindwing (Fig. 1) and on both wings on the ventral surface (Fig. 2). While the male is presently undescribed, male specimens should be easily recognized once found given the distinct appearance and barcode of *L. leeae.*

Description. Female (**male**: unknown). A large species with extensive pink suffusion on the dorsal hind wing and both wings on the ventral surface. **Dorsal surface** – forewing ground color gray brown, with a large reniform spot almost touching the orbicular spot. There is a deep zigzag in antemedial (am) and postmedial (pm) lines into median area fold where am and pm lines are connected by a thick black dash. Similar but thinner dashes occur from medial dash to subterminal (st) line, from lower margin of reniform spot to st line, and at wing base. Subterminal line deeply zigzagged. Basal two-thirds of hindwing heavily suffused with pink, with a light brown on outer third. Discal lunule prominent and brown. **Ventral surface** – ground color heavily suffused with pink on basal two-thirds of both fore- and hindwing. Reniform spot and discal

Figures 1-3. Adults of *Lithophane* species. **1, 2.** *L. leeae* Walsh, holotype. USA, Arizona, Cochise County, Chiricahua Mountains, Onion Saddle, 7700', 14 June 2007. **3.** *L. atara* (Smith), Canada, B. C., Summerland, 18 November 1994.

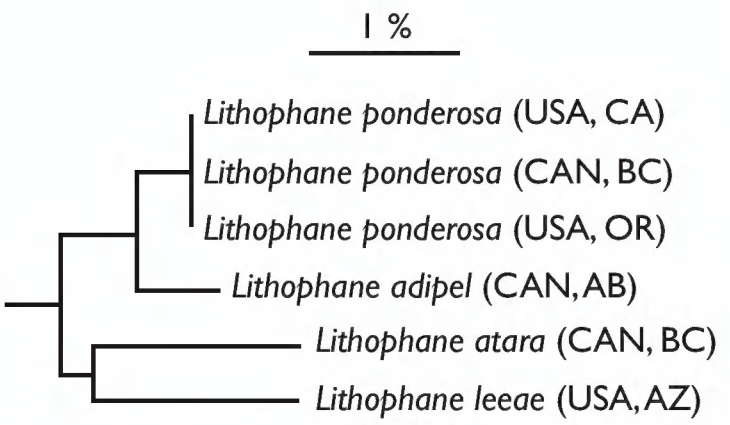

Figure 4. DNA phenogram of the *Lithophane lepida* species-group, based on the Neighbor-Joining reconstruction method with the Kimura 2-parameter (K2P) algorithm implemented in BOLD (Ratnasingham and Hebert 2007). Compare with the more extensive phenogram of the entire genus in the preceding paper by Brou and Lafontaine (2009).

lunule dark brown and prominent. **Abdomen** – pink lateral tufts of hair at distal end. Differs from *L. atara* in its much larger size (25.0 versus 18.0 mm forewing length in *L. atara*) and extensive bright pink suffusion on dorsal hindwing and very extensive pink suffusion on fore- and hindwings ventrally.

Biology and Distribution. The only known specimen was collected in mid-June at 7700' elevation in the Chiricahua Mountains, Arizona. Attracted to mercury-vapor lights. Based on its phylogenetic position and biology of other *Lithophanae*, *L. leeae* is most likely a pine-feeder and probably hibernates as an adult, flying in early spring.

Discussion

In the subsequent paper in this issue, Brou and Lafontaine (2009) present a phenogram of the relationships among 39 species of North American *Lithophane* based on the barcode fragment of cytochrome c oxidase 1 (CO1). This gene, located in the mitochondrial genome, is the basis for DNA "barcoding" (Hebert et al. 2003). Base pair differences are shown as percentages, and within-species differences for *Lithophane* were less than one percent. Based on the CO1 sequence, *L. leeae* is indeed a distinct species with a greater than three percent difference from its closest relative, *L. atara* (Smith). It clearly falls within the *L. lepida* Grote species-group (Brou and Lafontaine's Group VII). Figure 4 provides a more detailed DNA-based phenogram of this group based on sequences in the BOLD barcode data base (Ratnasingham and Hebert 2007). Troubridge and Lafontaine (2003) present a revision of this group, whose members are all apparently pine (Pinaceae) feeders.

The closest relative of *L. leeae*, *L. atara*, feeds on Ponderosa pine (*Pinus ponderosa* C. Lawson). Arizona pine (*P. arizonica* Engelm.), which historically has been treated as a variety of *P. ponderosa* but more recently viewed as a distinct species (Farjon and Styles 1997), is found at the type locality. Two other species of pine found at the type locality are also at the northern end of their distributions; both are more common in

the Sierra Madre Occidental in Mexico. These are Apache Pine (*P. engelmannii* Carrière) and Chihuahua Pine (*P. leiophylla* Schiede & Deppe). Any of these three species are potential hosts for *L. leeae*.

Why has *L. leeae* not been found before? The most obvious explanation would be that it is an early flier at high elevation. Historically, high elevations in the Chiricahua Mountains were not even modestly collected until late June. Hence, the type specimen could simply be a late individual that was unfortunate enough to have been collected. A second explanation could be that it represents a stray from the nearby mountains in northern Sonora (strays from which are well documented for numerous species of butterflies). The high elevations of the Chiricahuas contain other large, spectacular moth species such as *Caloecia entima* Franclemont (Lasiocampidae) and *Biston multidentata* (Guedet) (Geometridae: Bistonini) that are early summer fliers, rare in collections, and not seen in most years. For example, *B. multidentata* is known from less than a dozen individuals, and *C. entima* has only been taken sporadically, usually being absent for years at a time, although it can be common when taken. We can now add *L. leeae* to this group of large, but quite elusive, species.

Acknowledgements

Sincere thanks to Don Lafontaine of the Canadian National Collection of Insects, Arachnids, and Nematodes (CNC) for guiding this statistical geneticist through his first species description. Jocelyn Gill (CNC) did an outstanding job of preparing the color plate, working hard to capture *Lithophane leeae*, and Chris Schmidt (CNC) was kind enough to provide measurements and information on *Lithophane's* in the CNC, as well as offering useful comments on the manuscript. Finally, I thank Paul Hebert and the other members of the Barcode of Life Project at the University of Guelph, Ontario, for providing DNA data.

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